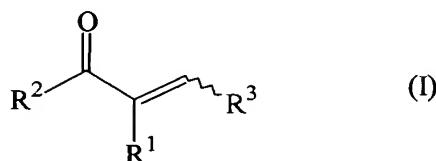


The Claims

What is claimed is:

5 1. A process for the preparation of a compound of formula



wherein:

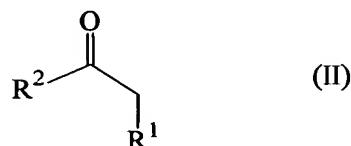
10 the wavy line indicates that the stereochemistry of the C=C double bond is not defined;

R^1 represents a hydrogen atom or a methyl group;

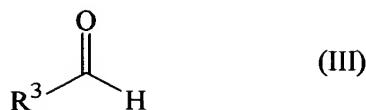
15 R^2 represents a methyl or ethyl group or a saturated or unsaturated gem-dimethyl C_6 ring, optionally substituted, provided that if R^1 is a hydrogen atom R^2 is a group having at least two carbon atoms; or said R^1 and R^2 taken together form a saturated or unsaturated gem-dimethyl C_6 ring, possibly substituted, or a saturated or unsaturated C_{12} ring, said ring including the carbon atom of the carbonyl function and the carbon atom to which R^1 is bonded; and

20 R^3 represents a hydrogen atom, a C_1 to C_4 linear or branched alkyl or alkenyl group, a linear or branched C_9 alkadienyl radical, or a CH_2R group, R being a saturated or unsaturated gem-dimethyl C_5 ring that is optionally substituted;

by reacting a starting ketone of formula



25 wherein R^1 and R^2 have the same meaning as in formula (I), with an aldehyde of formula



wherein R^3 has the same meaning as in formula (I),
in the presence of a metal complex of formula

5



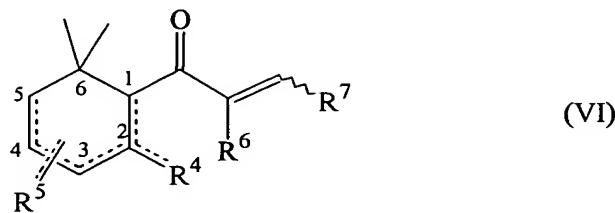
wherein M is a tetravalent metal cation selected from the group consisting of Ti, Zr and Hf, R^8 represents a C_{1-6} linear or branched alkyl group, X represents an halide such as a Cl or F atom and the index n represents an integer from 1 to 3;
10 and in the presence of a co-ingredient which is an alkyl or aromatic carboxylic acid anhydride containing 1 to 10 carbon atoms, BF_3 or an anhydrous salt selected from the group consisting of the sulfates, chlorides and bromides of a metal cation, wherein the metal cation is selected from the group consisting of Li^+ , Na^+ , K^+ , Cs^+ , Mg^{2+} , Ni^{2+} , Ca^{2+} ,
15 Zn^{2+} , Fe^{3+} and Al^{3+} .

2. The process of claim 1, wherein the ketone of formula (II) is selected from the group consisting of gem-dimethyl-cyclohexanones, gem-dimethyl-cyclohexenones and cyclododecanone, and the aldehyde of formula (III) selected from the group consisting of
20 formaldehyde, acetaldehyde, 2-propenal and 2-butenal.

3. The process of claim 1, wherein the ketone of formula (II) is methyl ethyl ketone and the aldehyde of formula (III) is 2,2,3-trimethyl-3-cyclopentene-1-acetaldehyde.

25

4. The process of claim 1, wherein the enone is of formula



wherein:

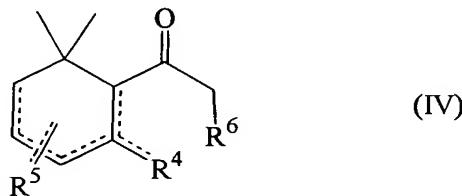
the wavy line indicates that the stereochemistry of the C=C double bond is not defined and the dotted lines indicate a single or a double bond;

R⁴ and R⁵ represent, simultaneously or independently, a hydrogen atom or a methyl, ethyl methylene or ethylidene group;

5 R⁶ represents a hydrogen atom or a methyl group; and

R⁷ represents a hydrogen atom or a C₁ to C₄ linear or branched alkyl or alkenyl group;

the ketone is of formula



10

(IV)

wherein R¹ and R² have the same meaning as in formula (VI),

and the aldehyde is of formula



15

(V)

wherein R⁴ has the same meaning as in formula (VI).

5. The process of claim 1, wherein R⁴ represents a methyl or methylene group,
20 R⁵ represents a hydrogen atom or a methyl or methylene group, R⁶ represents a hydrogen atom and R⁷ represents a methyl group.

6. The process of claim 5, wherein the starting aldehyde (V) is acetaldehyde and the ketone (IV) is selected from the group consisting of 1-(2,6,6-trimethyl-1-cyclohexen-1-yl)-1-ethanone, 1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-1-ethanone, 1-(2,6,6-trimethyl-3-cyclohexen-1-yl)-1-ethanone, 1-(2,2,6-trimethyl-3-cyclohexen-1-yl)-1-ethanone, 1-(2,2-dimethyl-6-methylene-1-cyclohexyl)-1-ethanone, 1-(2,6,6-trimethyl-1,3-cyclohexadien-1-yl)-1-ethanone, 1-(2,5,6,6-tetramethyl-1-cyclohexyl)-1-ethanone and 1-(2,2,6-trimethyl-3-methylene-1-cyclohexyl)-1-ethanone.

7. The process of claim 5, wherein the starting ketone (IV) is in the form of a mixture of isomers.

8. The process of claim 1, wherein M represents Ti(IV) or Zr(IV), R⁸ represents a linear or branched C₁₋₄ alkyl group, X represents a Cl atom and n is 2 or 3.

9. The process of claim 1, wherein the co-ingredient is selected from the group consisting of acetic, propionic or butyric anhydride, BF₃, anhydrous Na₂SO₄ or K₂SO₄ and an anhydrous chloride or bromide of Mg²⁺, Fe³⁺ or Zn²⁺.

10

10. A catalytic system consisting of a metal complex of formula



15 wherein M is a tetravalent metal cation selected from the group consisting of Ti, Zr and Hf, R⁸ represents a C₁₋₆ linear or branched alkyl group, X represents a Cl or F atom and the index n represents an integer from 1 to 3.